METADATA FOR THE 2000 FRESNO COUNTY LAND USE SURVEY DATA

Originator:

California Department of Water Resources

Date of Metadata:

January 14, 2004

Abstract:

The 2000 Fresno County land use survey data set was developed by DWR through its Division of Planning and Local Assistance. The data was gathered using aerial photography and extensive field visits, the land use boundaries and attributes were digitized, and the resultant data went through standard quality control procedures before finalizing. The land uses that were gathered were detailed agricultural land uses, and lesser detailed urban and native vegetation land uses. The data was gathered and digitized by staff of DWR's San Joaquin District and the quality control procedures were performed jointly by staff at DWR's DPLA headquarters from San Joaquin District.

The finalized data include DWG files (land use vector data), shape files (land use vector data), and JPEG files (raster data from aerial imagery).

Purpose:

This data is being developed to aid in DWR's efforts to continually monitor land use for the main purpose of determining the amount of and changes in the use of water.

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Data Development:

1. The aerial photography used for this survey was taken in mid June of 2000. The photos (natural color, 9" by 9", flown at 18,000' above ground with a 6" lens) were scanned at 300 DPI and plotted to a size of about 20" x 20".

2. The plotted images were taken to the field as field sheets, and virtually all the areas were visited to positively identify the land use. The site visits occurred in July through October 2000. Land use codes were printed within each area on the field sheets.

3. For those areas where the elevation changes were minimal, the scanned images were brought into an image processing system, the images were ratio-rectified (rubbersheeted) into a projection and mosiaced into USGS 1:24,000 quad sized files (photoquads). The files have a pixel size of 4 meters.

4. Using AUTOCAD (using a standardized digitizing process), the photoquads were used as a backdrop to delineate land use boundaries on-screen. For those areas where corrected imagery was not produced (because of excess elevation changes), land use boundaries were drawn onto USGS 1:24,000 quads, and those quad maps digitized on a digitizing tablet. The land use attributes were entered from the field sheets.

5. After quality control/assurance procedures were completed on each file (DWG), the data was finalized.

6. The linework and attributes from each DWG quad file were brought into ARCINFO and both quad and surveywide coverages were created, and underwent quality checks. These coverages were converted to shape files using ARCINFO.

Data Accuracy:

The corrected imagery (photoquads) was developed using between 12 and 15 ground control points established from terrain corrected satellite imagery with a stated accuracy of about 30 feet. The imagery has never been fully evaluated for positional accuracy, however we believe that the images have about 100 foot accuracy (90 percent of the time, the data is within 100 feet of its true position).

Projection Information:

The data (photoquads) is in a transverse mercator projection, with identical parameters to UTM projections, except the central meridian is -120 degrees (120 degrees west). For comparison, UTM 10 has a central meridian of 123 degrees west, and UTM 11 has a central meridian of 117 degrees west. This projection allows virtually all of

the geographic area of California to be in one 6 degree zone (as opposed to two zones, UTM 10 and 11).

Projection:	Transverse Mercator
Datum:	NAD27
Units:	Meter
Scale Reduction:	0.9996
Central Meridian:	120 degrees west
Origin Latitude:	0.00 N
False Easting:	500,000
False Northing:	0.00

Data Accuracy:

Linework for those areas where photoquads were developed:

The land use boundaries were drawn on-screen in AUTOCAD using the photoquads as a backdrop. The resultant digital linework for those areas is at best 100 foot accuracy.

Linework for those areas where photoquads were not developed:

The land use boundaries were hand drawn onto USGS 1:24,000 quads, and digitized on a digitizing tablet using AUTOCAD. For those areas where the lines were drawn onto USGS quads and digitized, the accuracy is less than that of the quads (about 50 foot accuracy).

The land use attribute accuracy is very high, because almost every delineated field was visited in the field. The accuracy is less than 100 percent because some errors must have occurred. There are three possible sources of attribute errors which are:

1) Misidentification of land use in the field (and entering that incorrect attribute on the field sheet);
2) Correct identification of land use, but entering an incorrect attribute on the field sheet, or;
3) Accidentally affixing an incorrect attribute during the digitizing process.

JPEG files were created for each quad where there was a minimum of elevation changes. The file naming convention is 00FRXXXX.JPG, where XXXX is the DWR quadrangle number. For example, files 00FR4336.JPG and 00FR4336.JGW are the quad files for the 2000 Fresno County land use survey for quadrangle 4336 (the Kerman quad). The .JGW file is the JPEG world file.

Land Use Attributes:

All land use attributes were coded using the Department's Standard Land Use Legend dated March 1999 (98legend.pdf). The legend explains

in detail how each delineated area is attributed in the field, and what the coding system is.

The actual land use code that is printed onto the field maps is different in arrangement than the codes that result from the digitizing process. The file attributes.pdf is a detailed explanation of the coding system used for both coding the field sheets, and the codes that end up in digitized form in the database files associated with the shape files.

Information on the AUTOCAD (DWG) Files:

The land use data is available in AUTOCAD 12 format by quad, with one file per quad. The file naming convention is 00FRXXXX.DWG, where XXXX is the DWR quadrangle number. For example, file 00FR4336.DWG is the AUTOCAD drawing file for the 2000 Fresno County land use survey for quadrangle 4336 (the Kerman quad).

Every quadrangle file has identical layers, nomenclature, and line colors. They are as follows:

Layer	Description	Color
0	AutoCAD's default layer	White
CQN	California DWR quad number	Cyan
GSN	USGS quad number	Cyan
LUB	Land use boundary lines	Yellow
LUC	Land use codes for GRASS	White
LUT	Visible land use text	Green
QB	The quad's boundary	White
QN	Quad name	Cyan

Following is an explanation of the attributes (for each delineated area) in the LUC layer of each quad file:

ACRES:	Number of acres in the delineated area (may or may not be present)
WATERSOURC:	The type of water source used for the delineated area
MULTIUSE:	Type of land uses within the delineated area
CLASS1:	The class for the first land use
SUBCLASS1:	The subclass for the first land use
SPECOND1:	The special condition for the first land use
IRR_TYP1:	Irrigated or non-irrigated, and irrigation system type for the first land use
PCNT1:	The percentage of land associated with the first land use
CLASS2:	The class for the second land use
SUBCLASS2:	The subclass for the second land use
SPECOND2:	The special condition for the second land use
IRR_TYP2:	Irrigated or non-irrigated, and irrigation system type for the second land use

PCNT2: The percentage of land associated with the second land use
CLASS3: The class for the third land use
SUBCLASS3: The subclass for the third land use
SPECOND3: The special condition for the third land use
IRR_TYP3: Irrigated or non-irrigated, and irrigation system type for the third land use
PCNT3: The percentage of land associated with the third land use

Information on the Shape Files:

Shape files were created for each quad, and one for the whole survey area. The naming convention used for the quad DWG files is used for the quad shape files (for example, 00FR4336.shp, 00FR4336.shx, and 00FR4336.dbf for quad number 4336, the Kerman quad). The name of the shape file for the whole survey area is 00FR.shp (and .dbf and .shx). Following is an explanation of the land use attributes in the DBF files:

BL_X: This is the X coordinate of the interior point in the delineated area
BL_Y: This is the Y coordinate of the interior point in the delineated area
ACRES: Number of acres in the delineated area (may or may not be present)
WATERSOURC: The type of water source used for the delineated area
MULTIUSE: Type of land uses within the delineated area
CLASS1: The class for the first land use
SUBCLASS1: The subclass for the first land use
SPECOND1: The special condition for the first land use
IRR_TYP1A: Irrigated or non-irrigated for the first land use
IRR_TYP1B: Irrigation system type for the first land use
PCNT1: The percentage of land associated with the first land use
CLASS2: The class for the second land use
SUBCLASS2: The subclass for the second land use
SPECOND2: The special condition for the second land use
IRR_TYP2A: Irrigated or non-irrigated for the second land use
IRR_TYP2B: Irrigation system type for the second land use
PCNT2: The percentage of land associated with the second land use
CLASS3: The class for the third land use
SUBCLASS3: The subclass for the third land use
SPECOND3: The special condition for the third land use
IRR_TYP3A: Irrigated or non-irrigated for the third land use
IRR_TYP3B: Irrigation system type for the third land use
PCNT3: The percentage of land associated with the third land use
UCF_ATT: Concatenated attributes from MULTIUSE to PCNT3

Information on the JPEG Files:

JPEG files were created for each quad where there was a minimum of elevation changes. The naming convention used for the quad JPEG photoquad files is 00FRXXXX.jpg where XXXX is the DWR quad number (for example, 00FR4336.jpg and 00FR4336.jgw for quad number 4336, the Kerman quad). The .jgw file is the JPEG world file.

Important Points about Using this Data Set:

1. The land use boundaries were either drawn on-screen using developed photoquads, or hand drawn directly on USGS quad maps and then digitized. They were drawn to depict observable areas of the same land use. They were not drawn to represent legal parcel (ownership) boundaries, or meant to be used as parcel boundaries.

2. This survey was a "snapshot" in time. The indicated land use attributes of each delineated area (polygon) were based upon what the surveyor saw in the field at that time, and, to an extent possible, whatever additional information the aerial photography might provide. For example, the surveyor might have seen a cropped field in the photograph, and the field visit showed a field of corn, so the field was given a corn attribute. In another field, the photograph might have shown a crop that was golden in color (indicating grain prior to harvest), and the field visit showed newly planted corn. This field would be given an attribute showing a double crop, grain followed by corn. The DWR land use attribute structure allows for up to three attributes per delineated area (polygon).

   In the cases where there were crops grown before the survey took place, the surveyor may or may not have been able to detect them from the field or the photographs. For crops planted after the survey date, the surveyor could not account for these crops. Thus, although the data is very accurate for that point in time, it may not be an accurate determination of what was grown in the fields for the whole year. If the area being surveyed does have double or multicropping systems, it is likely that there are more crops grown than could be surveyed with a "snapshot".

3. If the data is to be brought into a GIS for analysis of cropped (or planted) acreage, two things must be understood:

   a. The acreage of each field delineated is the gross area of the field. The amount of actual planted and irrigated acreage will always be less than the gross acreage, because of ditches, farm roads, other roads, farmsteads, etc. Thus, a delineated corn field may have a GIS calculated acreage of 40 acres but will have a smaller cropped (or net) acreage, maybe 38 acres.

b. Double and multicropping must be taken into account. A delineated field of 40 acres might have been cropped first with grain, then with corn, and coded as such. To estimate actual cropped acres, the two crops are added together (38 acres of grain and 38 acres of corn) which results in a total of 76 acres of net crop (or planted) acres.

4. Water source information was not collected for this survey.

5. If the data is compared to the previous digital survey (ie the two coverages intersected for change detection determination) there will be land use changes that may be unexpected.

   The linework was created independently, so even if a field's physical boundary hasn't changed between surveys, the lines may differ due to difference in digitizing. Numerous thin polygons (with very little area) will result. A result could be UV1 (paved roads) to F1 (cotton). In reality, paved roads are not converted to cotton fields, but these small polygons would be created due to the differences in digitizing the linework for each survey.

   Additionally, this kind of comparison may yield polygons of significant size with unexpected changes. These changes will almost always involve non-cropped land, mainly U (urban), UR1 (single family homes on 1 – 5 acres), UV (urban vacant), NV (native vegetation), and I1 (land not cropped that year, but cropped within the past three years). The unexpected results (such as U to NV, or UR1 to NV) occur mainly because of interpretation of those non-cropped land uses with aerial imagery. Newer surveys or well funded surveys have had the advantage of using improved quality (higher resolution) imagery or additional labor, where more accurate identification of land use is possible, and more accurate linework is created. For example, an older survey may have a large polygon identified as UR, where the actual land use was a mixture of houses and vacant land. A newer survey may have, for that same area, delineated separately those land uses into smaller polygons. The result of an intersection would include changes from UR to UV (which is normally an unlikely change).

   It is important to understand that the main purpose of DWR performing land use surveys is to aid in development of agricultural water use data. Thus, given our goals and budget, our emphasis is on obtaining accurate agricultural land uses with less emphasis on obtaining accurate non-agricultural land uses (urban and native areas).